"Device for Sizing a Yarn Sheet"

Specification:

The invention relates to a device for sizing a yarn sheet being moved in a conveying direction, having at least one sizing compartment for contacting the yarn of the sheet with sizing liquor, wherein a draw-in unit is connected upstream of the sizing compartment, and a squeezer for the sizing is connected downstream thereof, with means for pre-wetting the yarn in the sheet with a liquor which is at least diluted in respect to the sizing liquor, in particular preferably with hot water, prior to its contact with the sizing liquor, and with a wetting agent squeezer, placed between the pre-wetting means and the sizing compartment.

A device of this kind is described in DE 42 34 279 A1. In order to be able to conduct the yarn sheet, which consists of a plurality of parallel guided individual threads, correctly through the compartment with the liquid wetting agent and through the sizing compartment, in particular through the squeezers, a linear tension is exerted on the yarn sheet. To this end a draw-in unit is already placed upstream of the first wetting compartment, which opposes a certain braking force to the pulling force exerted by the squeezers in such a way, that the yarn sheet is tensed in the individual compartments all over in the linear direction of the individual yarns. The known device requires a separate wetting compartment, upstream of which the draw-in unit and downstream of which a wetting agent squeezer is placed. This entails a corresponding production outlay. An installation of the type described has a total width - measured in the axial direction of the squeezers - on an order of magnitude of 3 m. Therefore the center area of the yarn sheet is difficult to reach from the side of the machine. Since two or more units follow each other in the known device, the portions in the center of the machine can only be reached with difficulty from the inlet or outlet of the machine, even if the yarn sheet is fed from above or below.

The object of the invention is based on realizing a sizing device with a pre-wetting compartment connected upstream thereof in a compact manner in respect to easy accessibility, while simultaneously reducing the production outlay.

The attainment of the invention in connection with the device recited at the outset consists in that the draw-in unit is simultaneously embodied multi-functionally as the pre-moistening means and as the wetting agent squeezer. Some improvements and further embodiments of the invention will be described in what follows and in the independent claims.

In accordance with the invention, the pre-wetting means, including the associated squeezer, are integrated into the draw-in unit. A draw-in unit, such as disclosed in above mentioned DE 42 34 279 A1, for example, has three rollers. In accordance with the invention, these three rollers not only take on the task of a draw-in unit, but also that of a pre-wetting unit, including the associated squeezer. The draw-in unit therefore has a multifunction in accordance with the invention, i.e. it is used (as is customary) to let the respective yarn sheet, which had, for example, been drawn out of the unwinding creel of warping rollers, enter the sizing device at a predetermined speed. In accordance with the invention the further task is added, namely that of pre-wetting the yarn sheet with water or the like prior to entering the actual sizing bath, and to squeeze this pre-wetted yarn sheet in such a way that as little as possible pre-wetting agent gets into the sizing compartment; but the individual yarn remains moist.

The described multi-function of the draw-in unit surprisingly also makes a compact structure possible at the same time, because the units, namely the draw-in unit, wetting trough and wetting agent squeezer, which up to now followed each other in the yarn conveying direction, are combined in a single unit with double- or multi-functions of their individual parts. Since in accordance with the invention the draw-in unit comprises the pre-wetting means and the associated wetting agent squeezer, no additional space is required

for the pre-wetting compartment. The draw-in unit, combined in accordance with the invention, can therefore be placed in the immediate spatial vicinity upstream of the sizing compartment. This results in an extremely compact construction, a so-called modular structure, of a sizing device with a pre-wetting compartment. The yarn sheet can be fed from below to the draw-in unit combined in accordance with the invention, so that the center area of the device is also accessible to a person standing in the center above the yarn inlet.

Generally, hot water at a temperature at an order of magnitude of 85°C is used for pre-wetting. The yarn sheet should be squeezed and conducted into the sizing compartment at approximately this temperature. With the modular structure in accordance with the invention this is particularly easily possible, because the yarn sheet cools only slightly over the short distance of an order of magnitude of 1 m, between leaving the combined draw-in unit and running up on the first roller of the sizing compartment. A further reduction of the heat loss can be achieved if this area between the combined draw-in unit and the inlet to the sizing compartment is protected against heat loss by a cover or the like.

In further accordance with the invention it is possible to associate the three rollers of the draw-in unit with each other and to press them against each other in pairs in such a way that a nip, open toward the top, is created between the first two rollers in the conveying direction of the yarn sheet, and the gap between the second and third rollers in the conveying direction is usable as a wetting agent squeezer. At least one of the rollers, preferably the second roller, moreover can dip into wetting fluid in a pre-wetting trough. The yarn sheet is preferably conducted over the top of the (horizontal) first roller of the draw-in unit through the nip between the first and second rollers. Preferably the nip is kept full of wetting agent. Thus the yarn sheet runs in an orderly fashion on the surface into the wetting fluid dammed up in the nip. At the bottom of the nip, the yarn sheet runs through a (first) squeezing gap between the first and second rollers along the surface of the second

roller, preferably through the wetting agent trough, and further on the surface of the second roller into the (second) squeezing gap, which corresponds to the wetting agent squeezer, between the second and the third rollers. There, the yarn sheet is squeezed sufficiently so that the individual yarn remains wetted, but transports the least possible amount of wetting agent into the sizing compartment.

Thus, a draw-in unit combined in accordance with the invention comprises a pre-wetting device with two wetting and two squeezing stations. Only a total of three rollers are required for this, i.e. no more rollers than in any draw-in unit. Basically only means for charging the yarn sheet with wetting agent - i.e. in particular the fluid supply to the nip of the first and second rollers - are required in addition to the customary draw-in unit.

The compactness of the draw-in unit combined in accordance with the invention in connection with the downstream-connected sizing compartment is further improved if the second and third rollers of the draw-in unit are arranged essentially vertically above each other (i.e. with roller axes located essentially vertically on top of each other). After running off the third roller, the yarn sheet can be conducted over a minimally short distance to the surface of the first roller in the sizing compartment.

Some details of the invention will be explained by means of the schematic representation of an exemplary embodiment.

The device in accordance with the invention comprises a combined draw-in unit, identified as a whole by 1, and a sizing compartment, identified as a whole by 2. A yarn sheet 3, for example a yarn chain, reaches the draw-in unit 1 via a reversing roller 4 from below in the conveying direction 5. The yarn sheet 3 runs up on the top of the first roller 6 of the draw-in unit 1, and from there reaches a nip 9, formed between the first and the second rollers 6, 7 above a first squeezing gap 8, or into a first wetting agent supply reservoir 10 dammed up in the nip 9. The level 11 of the wetting agent supply reservoir 10 can be held constant with the aid of a pump 12. The pump 12 can convey fluid from a wetting agent

trough 13, into which the second roller 7 dips. The axes of the rollers are horizontally seated in the customary manner.

The yarn sheet 3 is moistened in the first wetting agent supply reservoir 10, and is subsequently squeezed in the first squeeze gap 8, it continues on the surface of the second roller 7 through the second wetting agent supply 14 contained in the wetting agent trough 13.

The yarn sheet 3 dipped into the wetting agent trough 13 is further conducted over the surface of the second roller 7 to the wetting agent squeezing gap 16 (wetting agent squeezer) formed between the second roller 7 and the third roller 15 of the draw-in unit 1. There, squeezing of the previously twice wetted yarn sheet 3 down to an amount customary in wetting units takes place. In an exemplary embodiment the squeezing force in the first squeezing gap 8 is on an order of magnitude of 10 kN, in the second squeezing gap 16 approximately 100 kN. The yarn sheet 3, which has been dewatered in the second squeezing gap 16 and is preferably still warm because of having been dipped into the hot wetting agent, preferably moves on as short as possible a free distance 17 from the surface of the third roller 15 to the surface of the first roller 18 of the sizing compartment 2. Should there be a danger of too great cooling of the yarn sheet 3 in spite of the only short distance 17, a thermally insulating cover 19 can be provided over the distance.

The sizing compartment 2, which is connected downstream of the combined draw-in unit 1 of the invention, can be embodied in the customary manner. In the exemplary embodiment the yarn sheet 3 first passes through a first sizing agent reservoir 20, which is dammed up in the nip 21 above a first squeezing gap 22 between the first roller 18 and the second roller 23. On the surface of the second roller 23, the yarn sheet 3 then passes through a second sizing agent supply 25 dammed up in a trough 24, and finally over the surface of the second roller through a second squeezing gap 27 (sizing squeezer) provided between the second roller 23 and the third roller 26 of the sizing compartment 2. The third roller 26 can

also dip into the second sizing agent supply 25. The squeezing force in the squeezing gap 22 between the first roller 18 and the second roller 23 can be of an order of magnitude of 10 kN, the squeezing force between the second roller 23 and the third roller 26 in the gap 27 can be of an order of magnitude of 50 nM.

In the exemplary embodiment, the squeezing forces of the rollers can be set with the aid of pressure means 28 and 29, partially schematically represented, for example compressed air cylinders. In both cases the second roller 7, or 23, can be driven, while the other two rollers are idling along.

A device for sizing a yarn sheet is described, having at least one sizing compartment for contacting the yarn with sizing liquor, upstream of which a draw-in unit is connected, and downstream of which a sizing agent squeezer is connected. In order to achieve pre-wetting of the yarn sheet with water or the like prior to its entering the sizing liquor and that it can be squeezed following pre-wetting, but prior to sizing, without additional units being required in principle, the draw-in unit is multi-functionally designed simultaneously as a pre-wetting device and as a wetting agent squeezer.

List of Reference Numerals

1 = Draw-in unit

2 = Sizing compartment

3 = Yarn sheet

4 = Reversing roller

5 = Conveying direction

6 = First roller (1)

7 = Second roller (1)

8 = First squeezing gap (1)

9 = Nip (8)

10 = First wetting agent supply reservoir (1)

11 = Level (10)

12 = Pump

13 = Wetting agent trough

14 = Second wetting agent supply (1)

15 = Third roller (81)

16 = Wetting agent squeezing gap

17 = Free distance

18 = First roller (2)

19 = Cover (17)

20 = First sizing agent reservoir (2)

21 = Nip

22 = First squeezing gap (2)

23 = Second squeezing roller (2)

24 = Trough

25 = Second sizing agent supply (2)

26 = Third roller (2)

27 = Second squeezing gap (2)

28 = Compressed air cylinder (1)

29 = Compressed air cylinder (2)